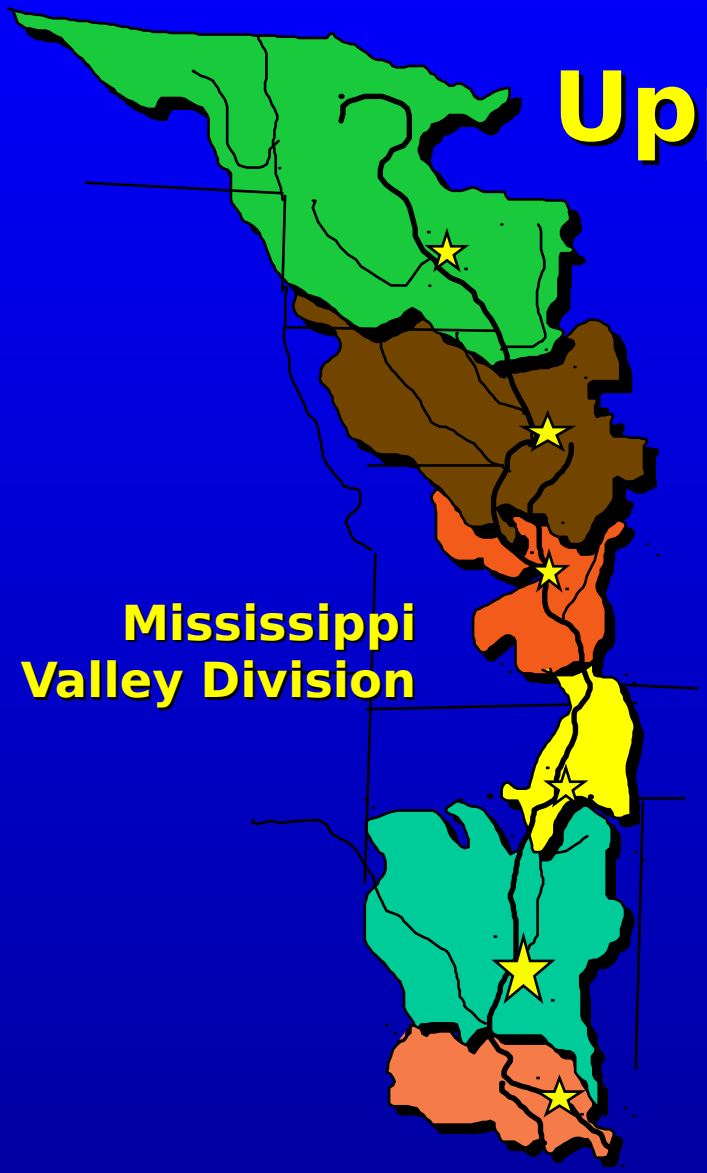


# Upper Mississippi River –

# Illinois Waterway System Navigation Feasibility Study

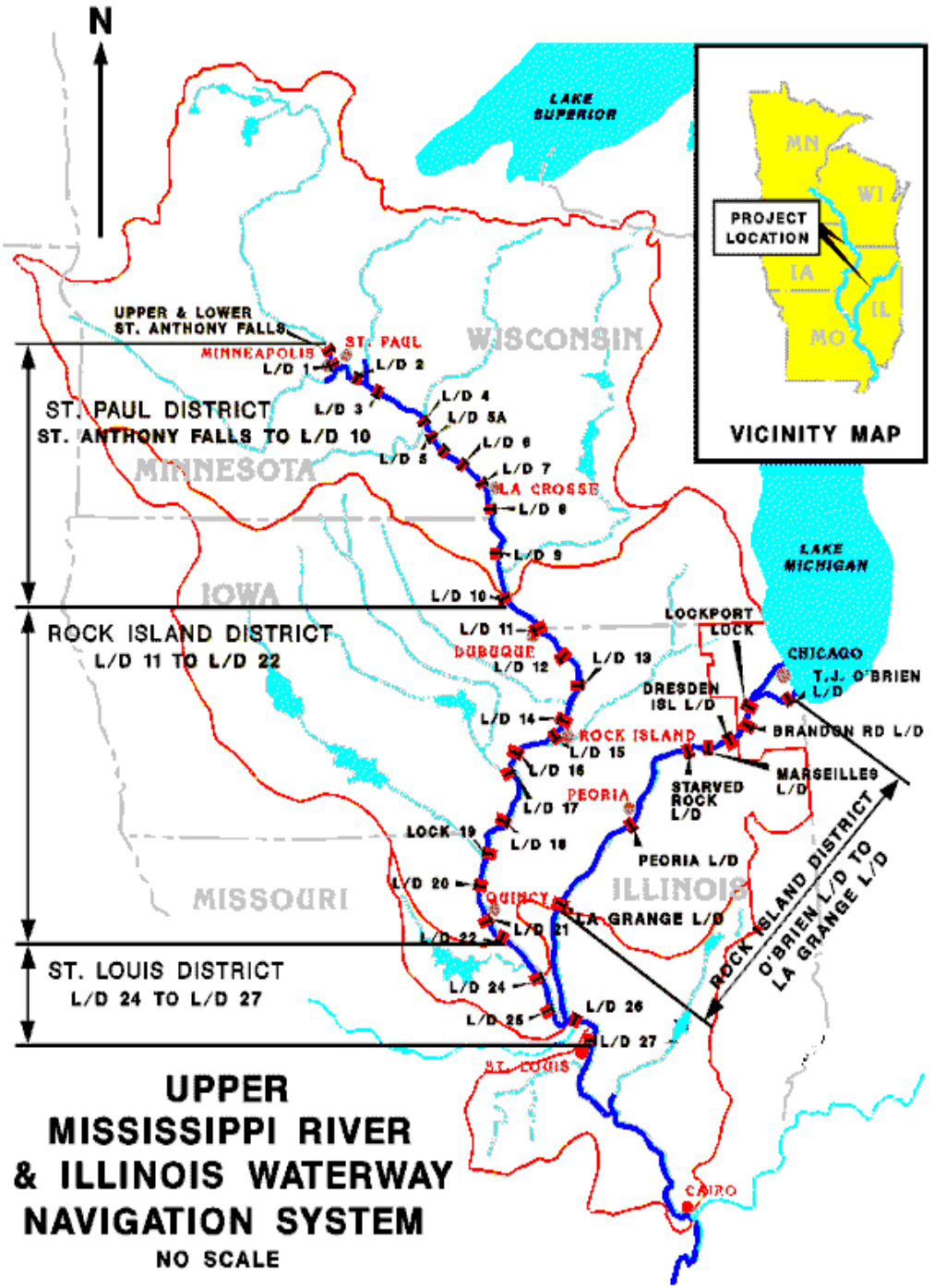
## Economic & Environmental Conference
## April 2004

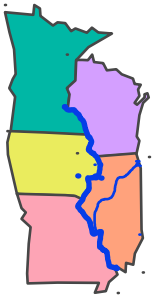
# structured Study Aug 01

- **Scope**: Focus on authorized Federal navigation projects and the ecological and floodplain resources that are affected by these projects.
- **Objectives**
  - Improve Navigation Efficiency.
  - Achieve environmental sustainable system.
  - Address ecosystem, floodplain management needs related to

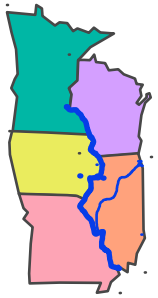
# Navigation System

- 37 Navigation Lock and Dam Sites
- 1200 Miles of Navigable Channel



# COLLABORATION



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U.S. FISH & WILDLIFE SERVICE
DEPARTMENT OF THE INTERIOR

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

USDA

***"To seek long-term sustainability of the economic uses and ecological integrity of the Upper Mississippi River System"***

GREAT SEAL OF THE STATE OF WISCONSIN
FORWARD

THE GREAT SEAL OF THE STATE OF MINNESOTA
1858

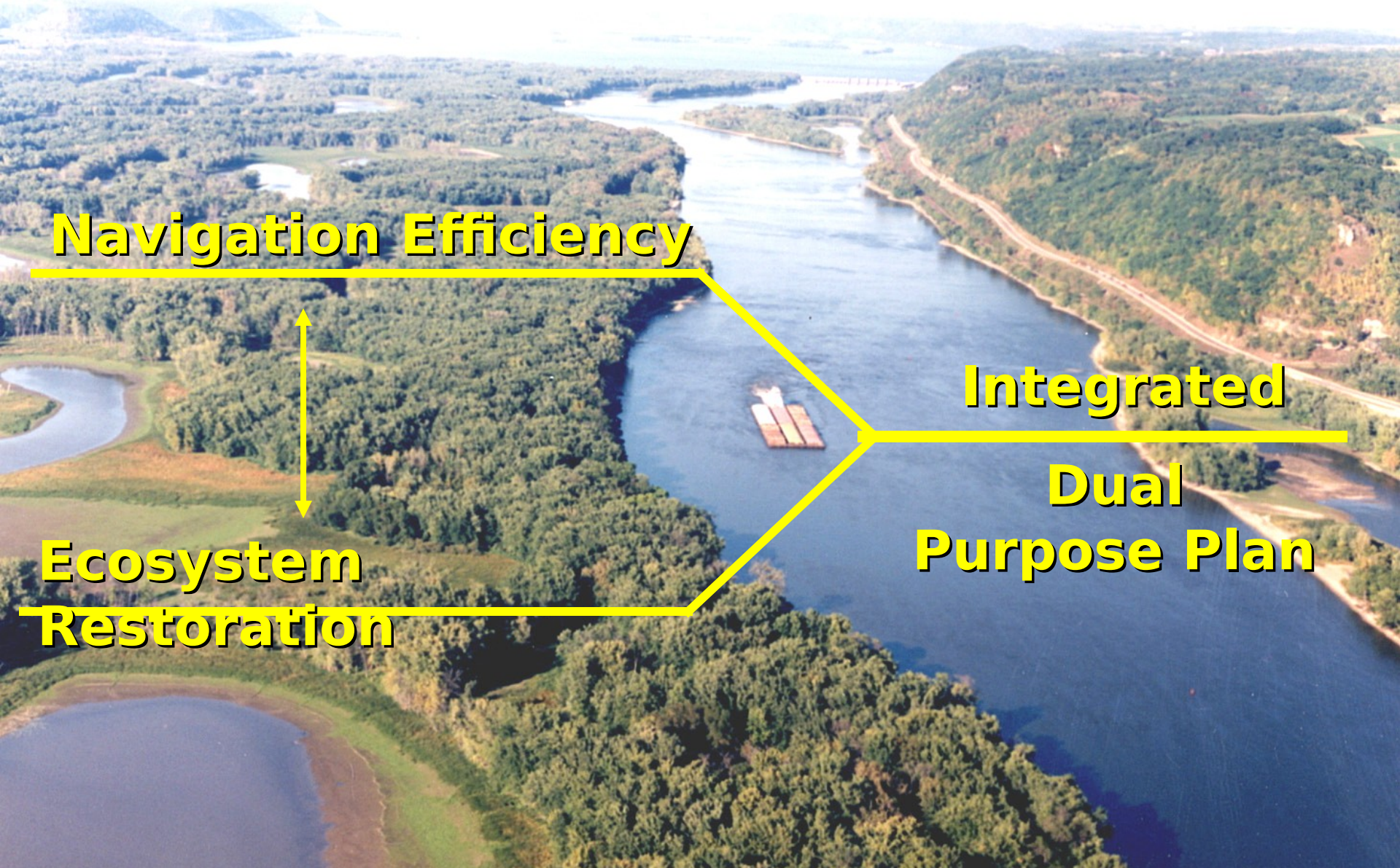
THE GREAT SEAL OF THE STATE OF IOWA

THE GREAT SEAL OF THE STATE OF MISSOURI

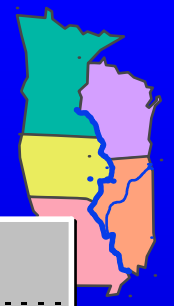
SEAL OF THE STATE OF ILLINOIS
AUG. 26TH 1818

**PUBLIC** **NGO's**

# Study Process



# Future Conditions

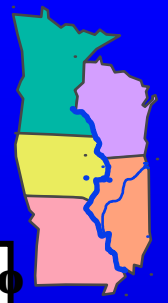


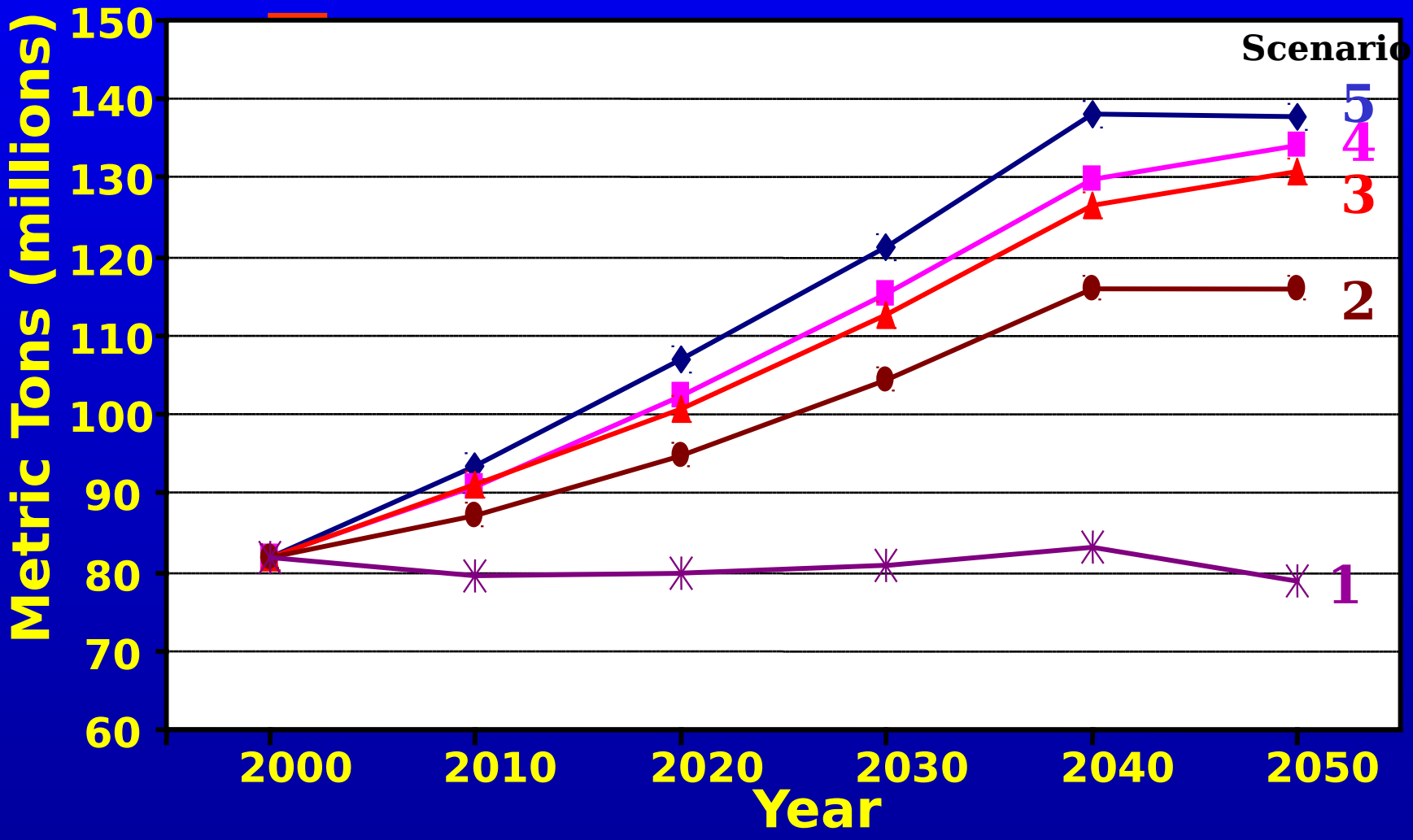
# Scenario Development

- World Trade
- Crop Area
- Crop Yield
- Consumption

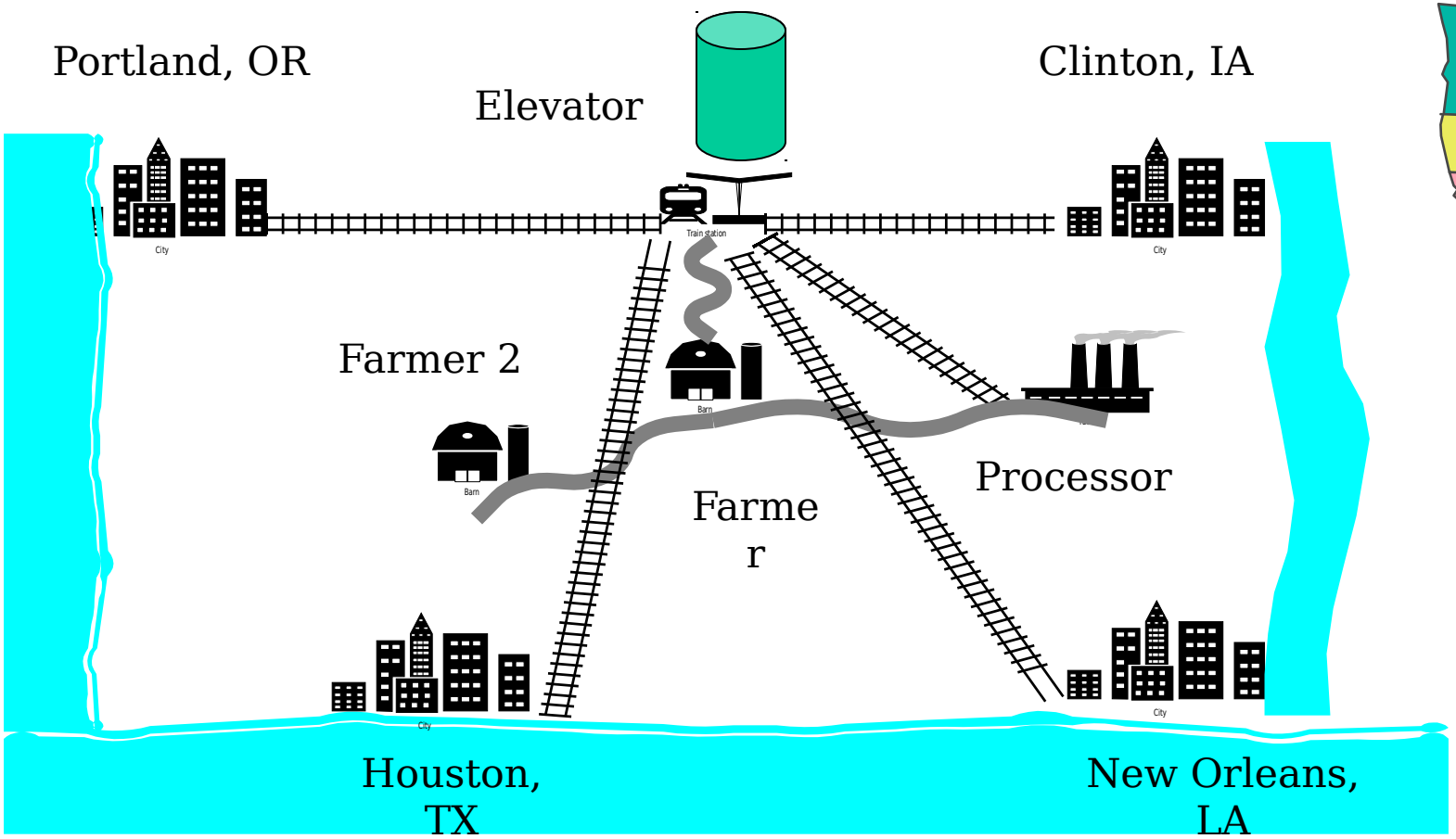
SPARKS COMPANIES INC.

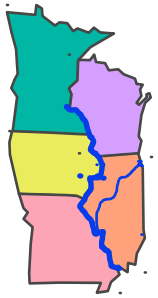
# Traffic






SPARKS COMPANIES INC



## Alternatives

1. Use the corn
2. Sell local
3. Sell to processor
4. Sell to Elevator
   a. processor
   b. New Orleans
   c. Houston
   d. Portland

# Evaluation of Alternatives

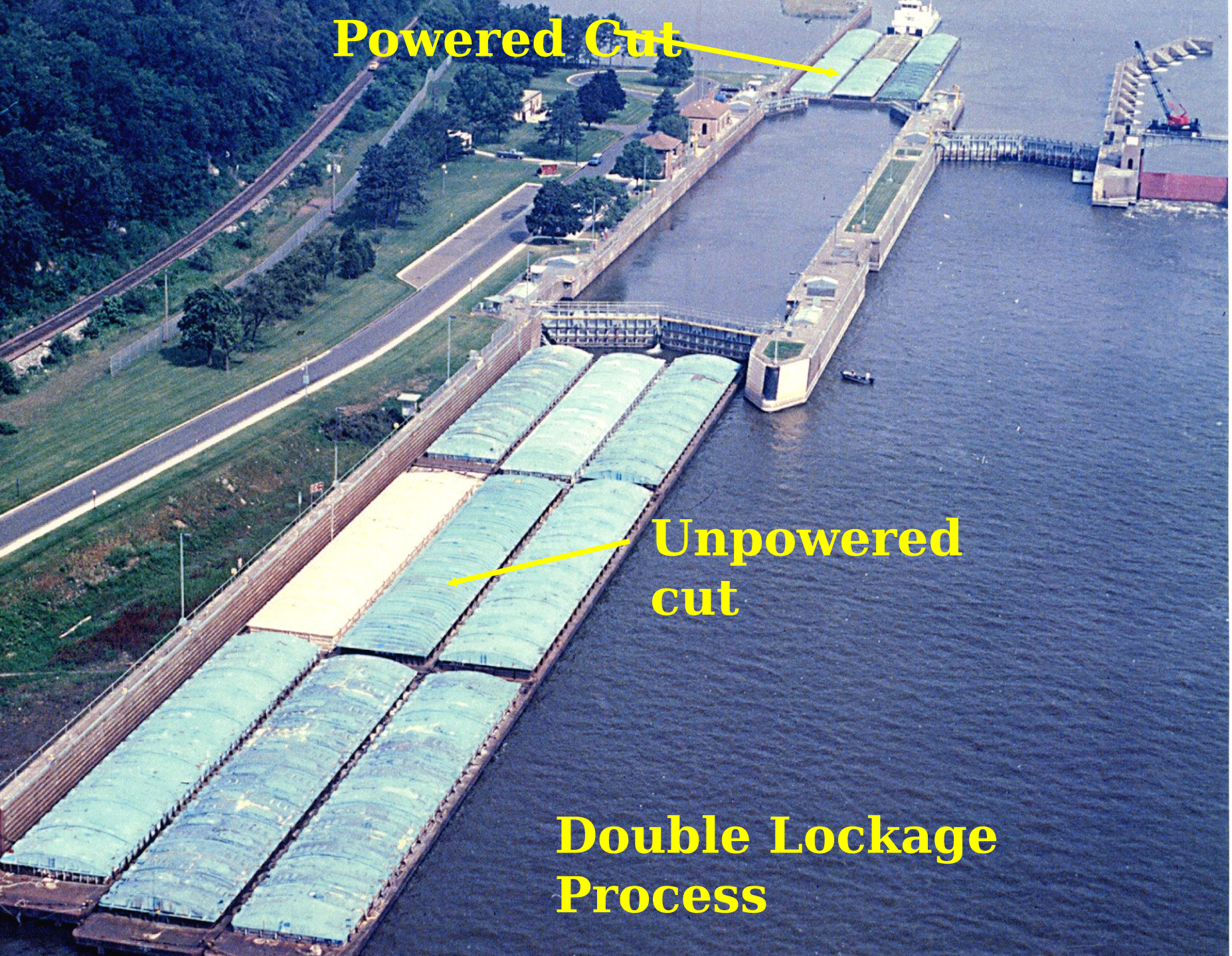
## National Economic Development

- 15 Economic Conditions
  - 5 Scenarios
  - 3 Model Assumptions
    - Tow Cost Model (TCM)
    - ESSENCE (EUB & ELB)

# Formulate Alternative Plans

- Non-structural Measures
  - Switchboats
  - Demand Management/Scheduling
  - Congestion Fees
- Structural Measures
  - Mooring Facilities
  - Lock Extensions
  - New Locks

Traffic

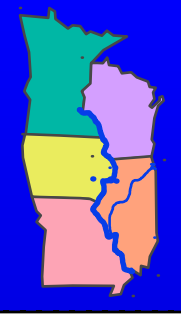

Powered Cut
Unpowered cut
Double Lockage Process

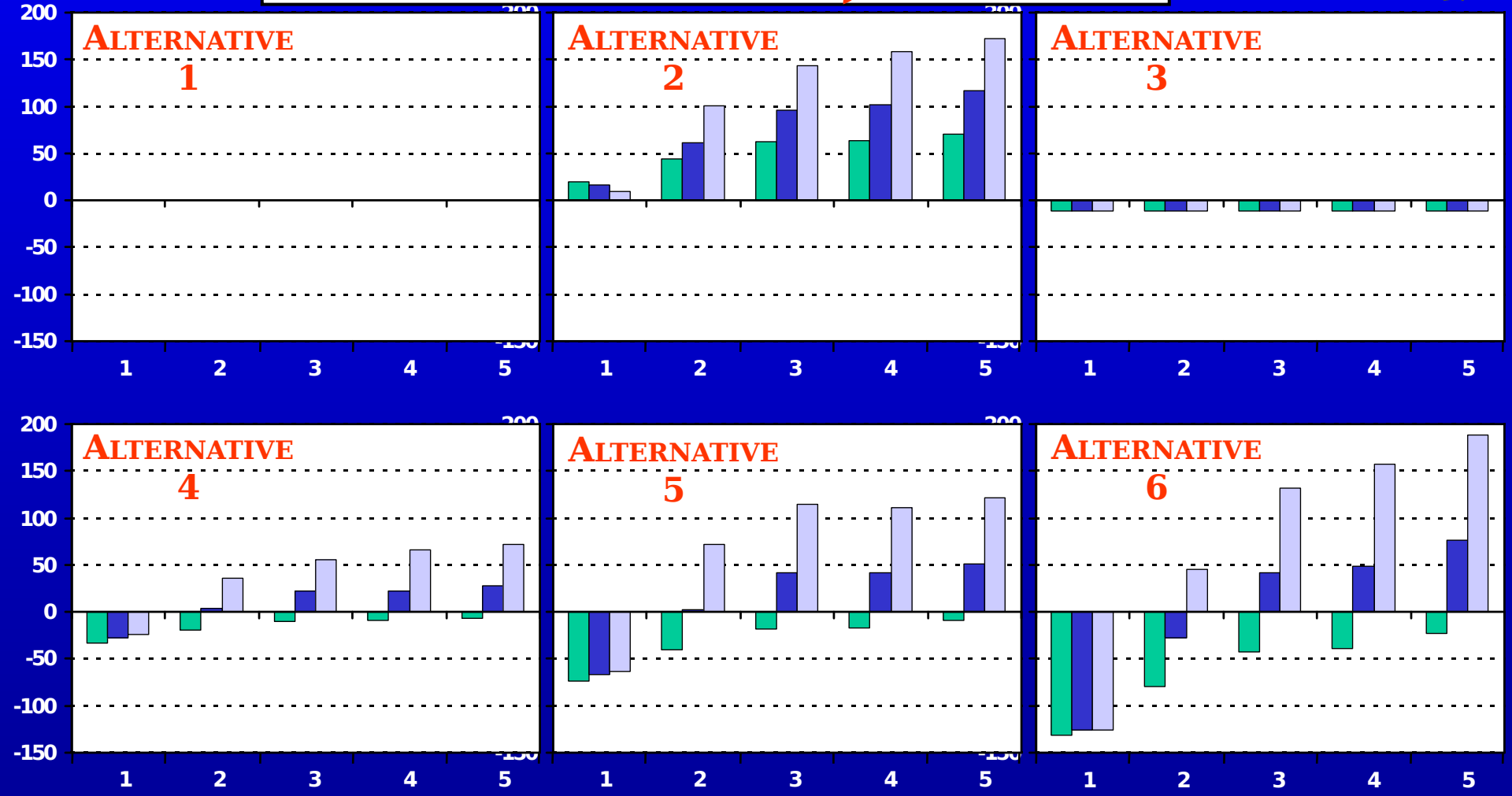
# Environmental Quality

- Site Specific
- Cumulative
- System

# ROBUSTNESS

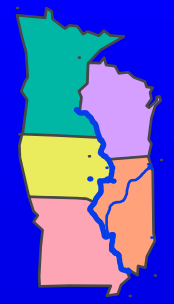
## Avg. Annual Net Benefits ($ millions)





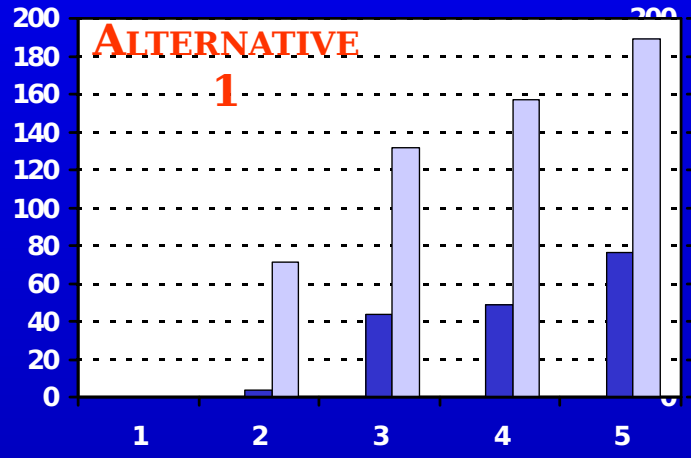
# RISK

## Avg. Annual Net Benefits ($ millions) Foregone

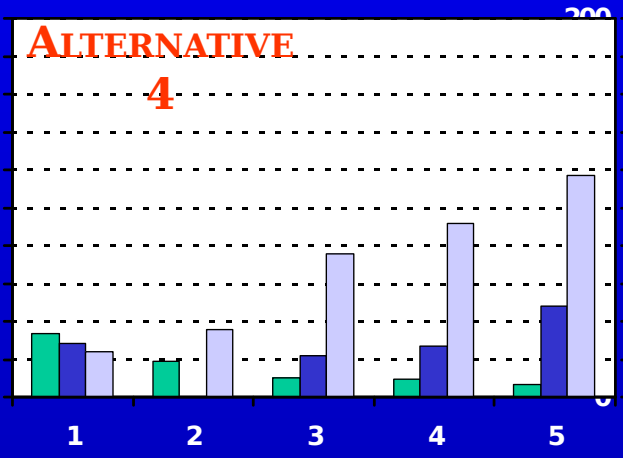


EUB – EOB – TCM

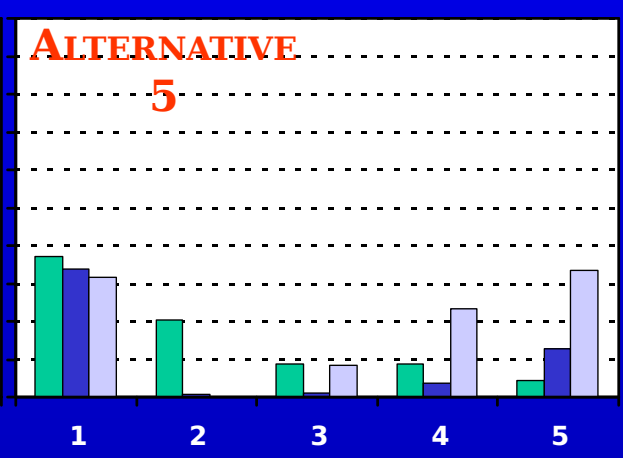
**Alternative 1**



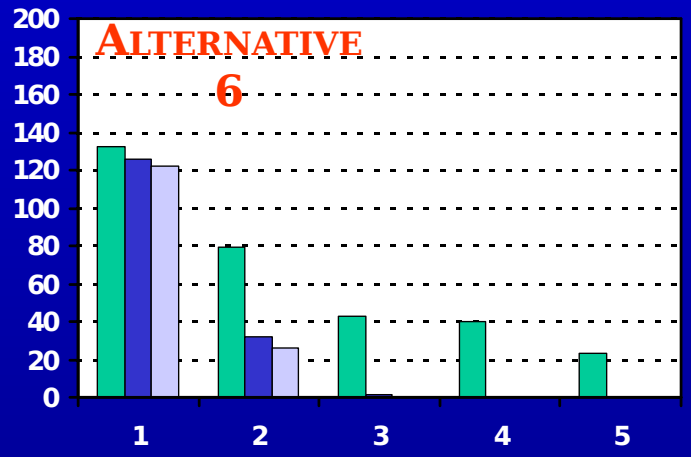

**Alternative 4**



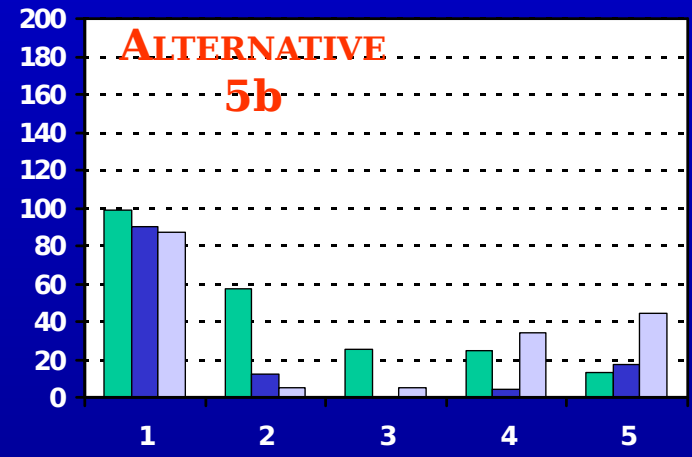

**Alternative 5**




**Alternative 6**

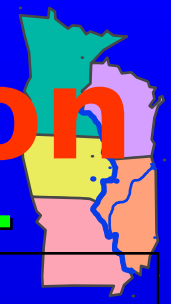



**Alternative 5b**




**Scenarios**

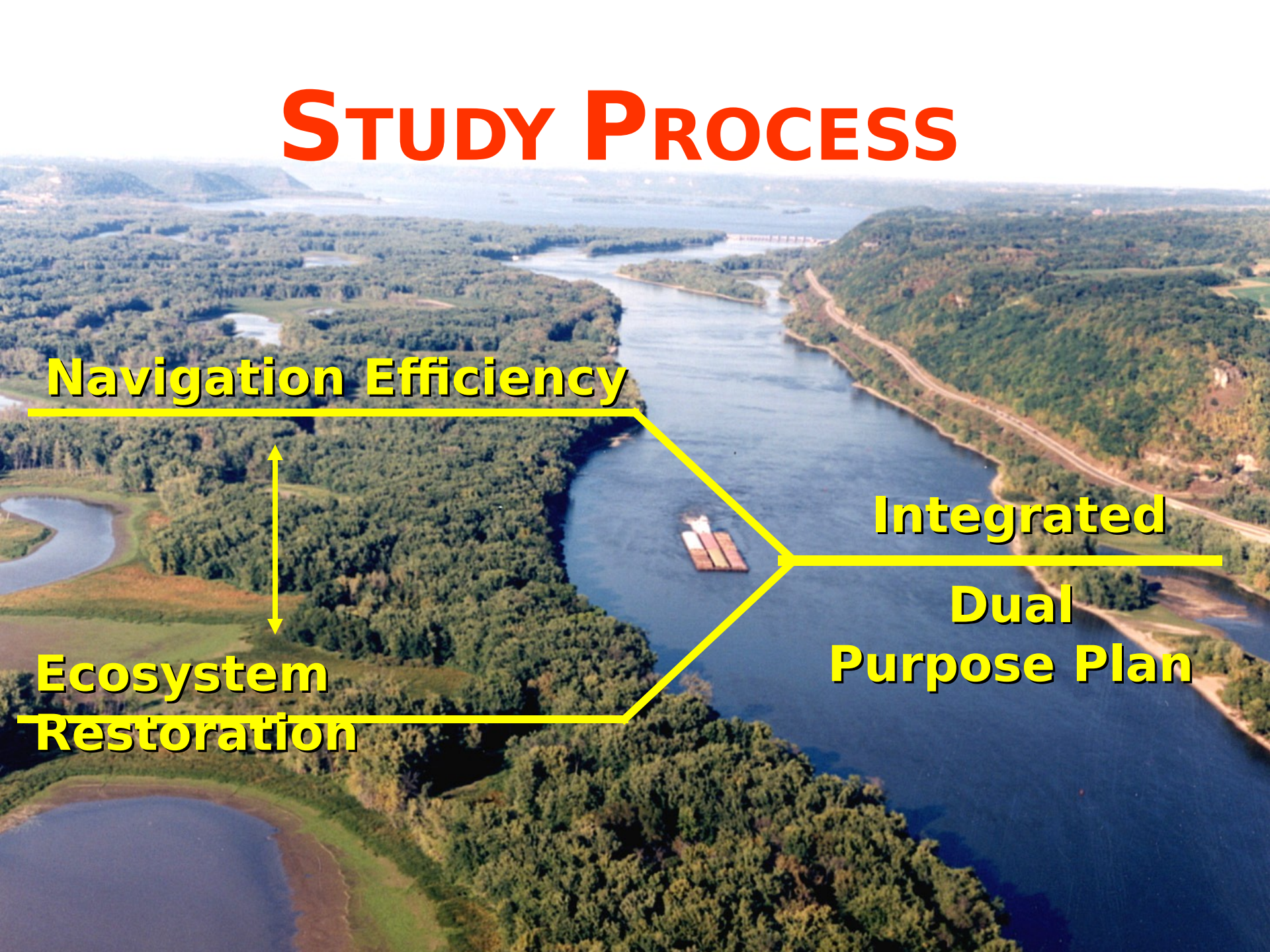
# Premise Set Comparison



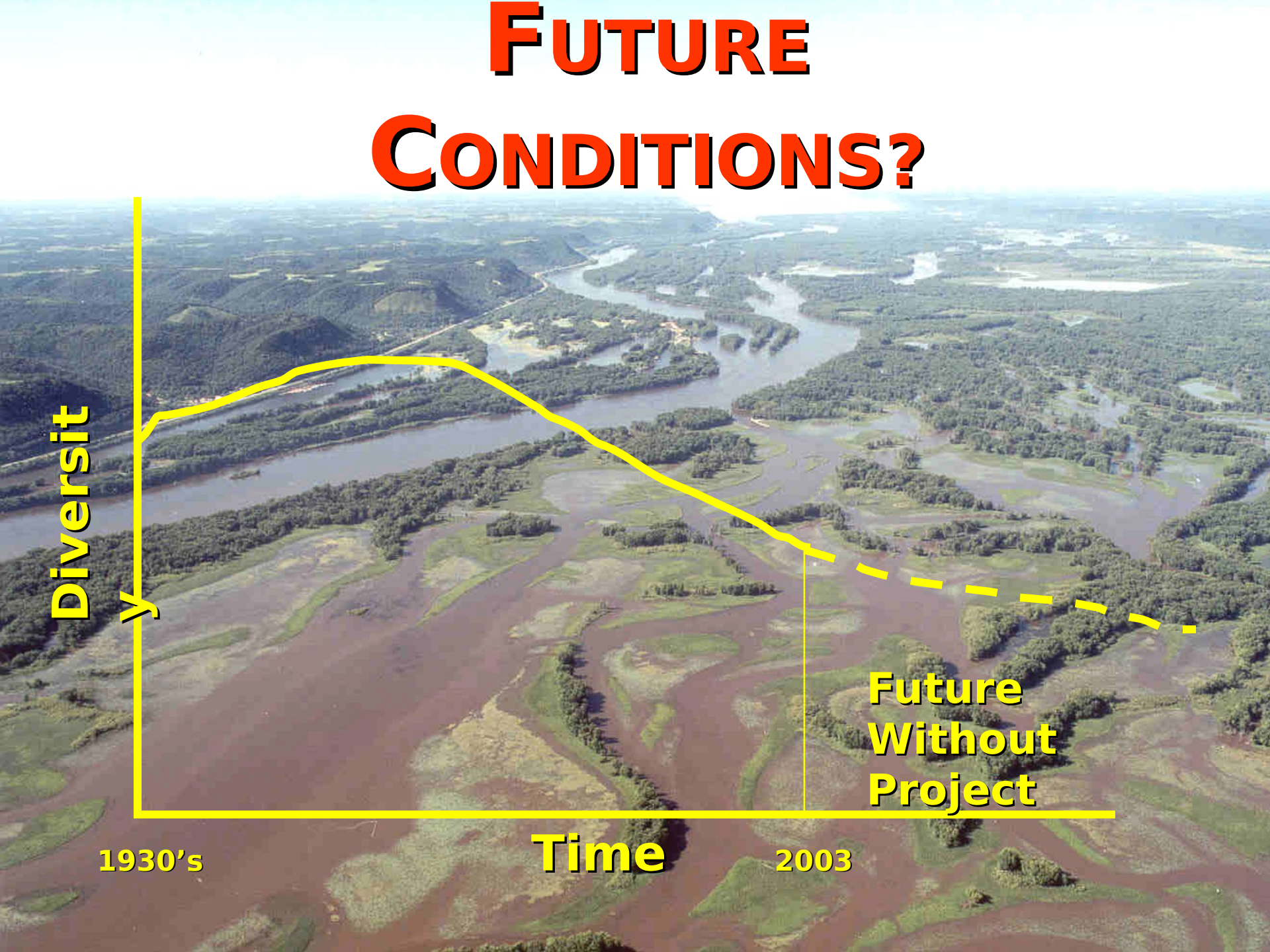
(Alternative that maximizes net benefits)

| Demand Elasticity | Scenario 1 | Scenario 2 | Scenario 3 | Scenario 4 | Scenario 5 |
|---|---|---|---|---|---|
| TCM | 1 | 5 | 6 | 6 | 6 |
| ELB | 1 | 4 | 5B or 6 | 6 | 6 |
| EUB | 1 | 1 | 1 | 1 | 1 |

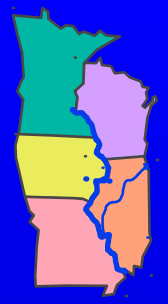
# Study Process

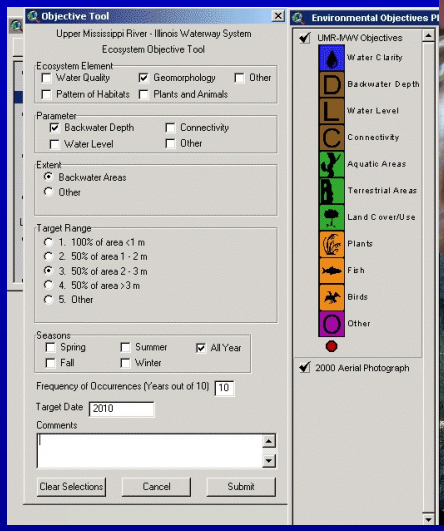


# Future Conditions?



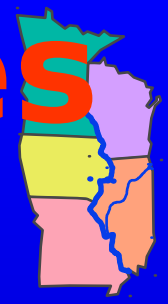
# Establishing Environmental Sustainability Objectives



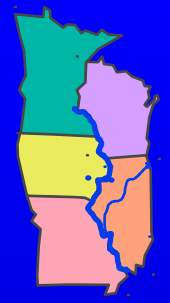


| | | | | | Season | Frequency of Occurrence | Target Date | Comments |
|---|---|---|---|---|---|---|---|---|
| **Water Quality** | **Main Channel Area (5)** | **1** | River Miles 155-157 | TR=2 | Spr - Sum | 5 | 2007 | This should be implemented along with increase in aquatic plants |
| ***Comments/ Additions:*** | | | | | | | | |
| | Back Water Area | | Worley Lake | NTU <20 | Spr-Sum | 5 | 2007 | This should be implemetned along with #1 |
| | | | | | | | | |
| **Geomorphology** | | | | | | | | |
| *Comments/ Additions:* | | | | | | | | |

# Geomorphic Reaches



# Ecosystem Sustainability Objectives

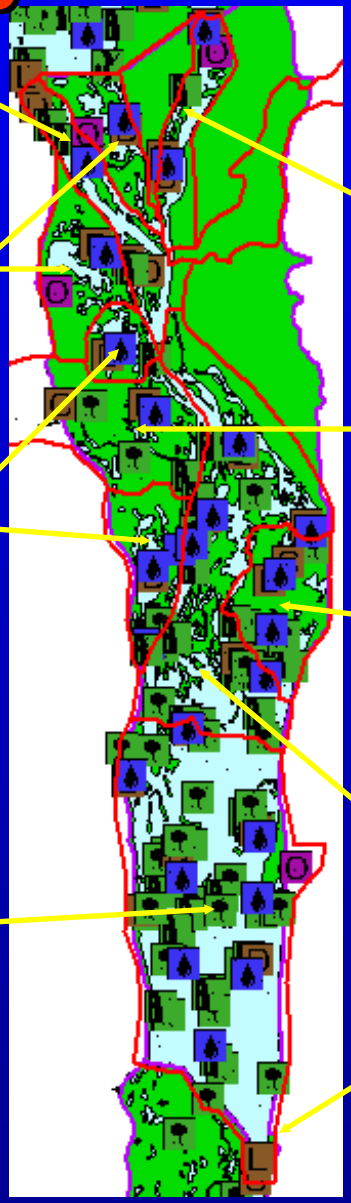


Terrestrial Area Prot.

Backwater Depth / Habitat Restoration

Backwater Depth

Bathymetric Diversity / Habitat Restoration



Navigation Pool 8

Backwater Depth / Aquatic Area Rest.

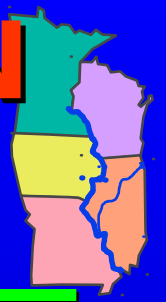
Habitat Restoration

Backwater Depth / Connectivity

Terrestrial Area Prot. / Habitat Restoration

Naturalize Hydrology

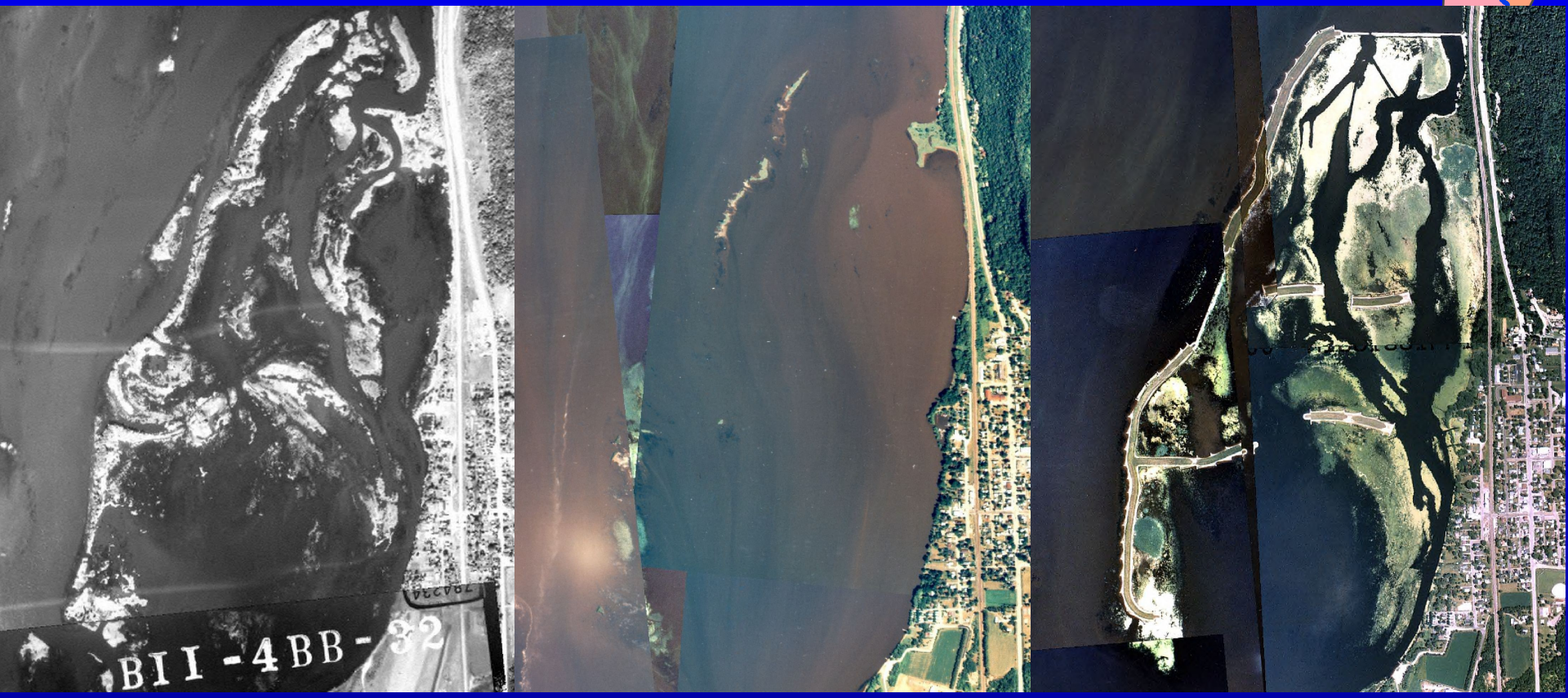
# Ecosystem Restoration Measures



- Island Building
- Fish Passage
- Floodplain Restoration
- Water Level Management
- Backwater Restoration
- Side Channel Restoration
- Wing Dam/Dike Alteration
- Island/Shoreline Protection
- Topographic Diversity
- Dam Point Control

# Island Protection and Restoration

## Pool 8 Islands HREP Phase II, near Stoddard, Wisconsin




October 1961

August 1994

August 2000

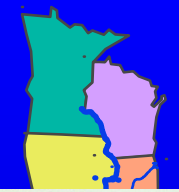
# ter Level Management to Improve Aquatic Hab

## Peck Lake, Pool 9, Wisconsin

# Fish Passage

**1 Project Site: $20 – $25 Million**

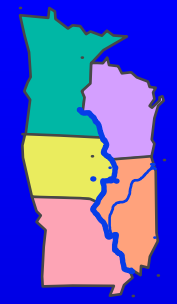
# Floodplain Restoration

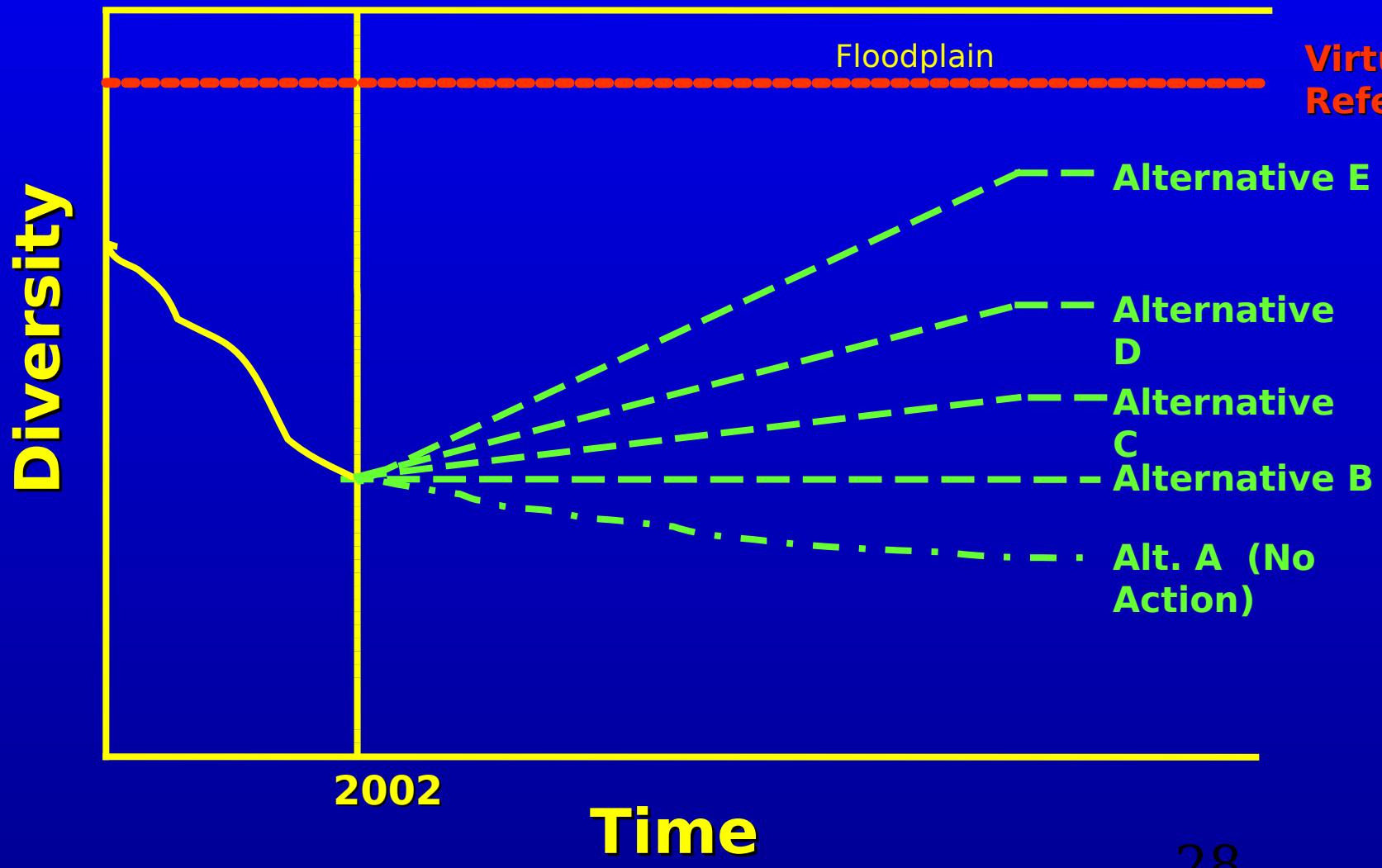


October 1998

May 2003

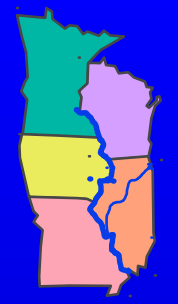
# Ecosystem Restoration Alternatives





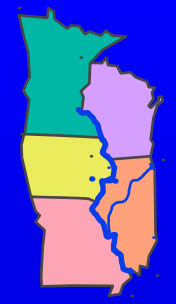

*** Not to Scale - Illustrative Purposes***

# Environmental Benefits Area of Influence



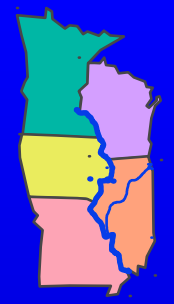
| UMR-IWW Ecosystem Measure Benefits | | Area of Influence (Acres) | | | |
|---|---|---|---|---|---|
| Ecosystem Measure | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E |
| Island Building | 0 | 31,000 | 68,000 | 91,000 | 116,000 |
| Fish Passage | 0 | - | - | - | - |
| Floodplain Restoration | 0 | 1,000 | 1,000 | 90,500 | 236,500 |
| Water Level Management - Pool | 0 | - | - | - | - |
| Water Level Management - Backwater | 0 | 0 | 1,000 | 7,000 | 9,000 |
| Backwater Restoration (Dredging) | 0 | 43,200 | 82,800 | 124,800 | 162,000 |
| Side Channel Restoration | 0 | 5,800 | 10,700 | 14,700 | 17,300 |
| Wing Dam/Dike Alteration | 0 | 180 | 510 | 640 | 680 |
| Island Protection | 0 | 37,680 | 37,680 | 37,680 | 37,680 |
| Shoreline Protection | 0 | 705 | 705 | 705 | 705 |
| Topographic Diversity | 0 | 256 | 256 | 256 | 256 |
| Dam Point Control | 0 | 0 | 6,000 | 6,000 | 9,000 |
| Floodplain Restoration - Immediate Opportunities | 0 | 0 | 15,000 | 15,000 | 15,000 |
| Total Area of Influence | 0 | 119,821 | 223,651 | 388,281 | 604,121 |

# Alternative Subset Cost Effectiveness

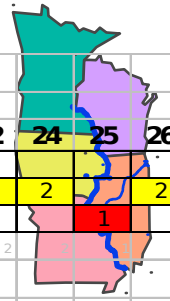


| | Alt. A | Alt. B | Alt. C | Alt. D | Alt. E |
|---|---|---|---|---|---|
| **A1b. Alternative Cost (w/out Fish Passage or WLM)** | $0 | $1.6B | $2.7B | $4.3B | $6.3B |
| **A2. Environmental Benefits (area of influence)** | 0 | 119,800 | 223,700 | 388,300 | 604,100 |
| **A3a. Alternative Cost Effectiveness (cost per acre)** | $0 | $13,000 | $12,000 | $11,000 | $10,400 |

# Water Level Management Selection Criteria



| | Criteria: | Need | | Feasibility | Efficiency | Acceptability |
|---|---|---|---|---|---|---|
| River | Pool | Defined Nav Study WLM Objective? | Pool Plan Objective | Hydrology | B/C Efficiency | Impacts to Other Users & Other Concerns |
| UMR | 11 | Yes | Yes | High | Very High | Moderate |
| | 12 | Yes | Yes | Low | High | Moderate |
| | 13 | Yes | Yes | High | High | Moderate |
| | 14 | Yes | Yes | High | Moderate | Moderate |
| | 15 | Yes | Yes | High | Low | Low |
| | 16 | Yes | Yes | Moderate | Moderate | Moderate |
| | 17 | Yes | Yes | Very Low | Low | High |
| | 18 | Yes | Yes | Moderate | Moderate | Moderate |
| | 19 | Yes | Yes | Very High | High | Low |
| | 20 | Yes | No | Low | Very Low | High |
| | 21 | Yes | No | Low | Very Low | Moderate |
| | 22 | Yes | No | Low | Low | High |
| | | | | | | |
| IWW | Dresden | No | No | Very High | Low | High |
| | Marseilles | No | No | Very High | Low | Moderate |
| | Starved Rock | No | No | High | Low | High |
| | Peoria | No | No | Low | High | Low |
| | LaGrange | No | No | Low | Moderate | Moderate |



## Existing Opportunity for Fish Passage

**Variable: Percent of time that dam gates are out of the water**

| | Locks and Dams: | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low | 0 to 10 % | 3 | 3 | | 3 | 3 | | 3 | 3 | 3 | | | 3 | | 3 | 3 | 3 | | | | 3 | | | | | | |
| Medium | 10 to 20 % | | | 2 | | | 2 | | | | 2 | 2 | | 2 | | | | 2 | | 2 | | | | 2 | 2 | | 2 |
| High | 20 + % | | | | | | | | | | | | | | | | | | 1 | | | 1 | 1 | | | 1 | |
| | Rank | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 1 | 1 | 2 | 2 | 1 | 2 |

## Access to Habitat in Navigation Pool

**Variable: Water area of navigation pool**

| | Locks and Dams: | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High | >15,000 ha | | | | 3 | | | | | 3 | 3 | 3 | 3 | | 3 | | | | | | 3 | | | | | | 3 |
| Medium | 5,000 to 15,000 ha | | | 2 | | 2 | | | 2 | | | | | 2 | | 2 | | 2 | 2 | 2 | | 2 | 2 | 2 | 2 | 2 | |
| Low | >5000 ha | 1 | 1 | | | | 1 | 1 | | | | | | | | | 1 | | | | | | | | | | |
| | Rank | 1 | 1 | 2 | 3 | 2 | 1 | 1 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 |
| Hard substrate spawning habitat: | | | | | | | | | | | | | | | | | | | | | | | | | | | |

## Access to Tributaries

**Variable: Longitudinal Connectivity Index (LCI)**

| | Navigation Pools | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High | >2000 | | 2669 | | 2209 | | | | | | | 1978 | | | | | | | | 2113 | 2089 | | | 2576 | | | 9982 |
| Medium | 1000 - 2000 | | | | | | | | | 1110 | 1049 | | 1393 | | 1263 | 1068 | | | | | | 1513 | 1143 | | 1255 | | |
| Low | <1000 | 93 | | 845 | | 863 | 497 | 529 | 697 | | | | | 806 | | | 251 | 536 | 419 | | | | | | | 923 | |
| | Rank | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 3 | 3 | 2 | 2 | 3 | 2 | 1 | 3 |
| Hard substrate spawning habitat: | | | | | | | | | | | | | | | | | | | | | | | | | | | |

## Cost of Fishways

**Variable: Cost of rock ramp or bypass fishway**

| | Locks and Dams: | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Low | < $20 M | -- | | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | | 3 | 3 | 3 | | 3 | 3 | 3 | 3 | 3 | |
| Medium | $20 M - $30 M | -- | 2 | | | | | | | | | | | | | | 2 | | | | | | | | | | 2 |
| High | > $30 M | -- | | | | | | | | | | | | | | | | | | | 1 | | | | | | |
| | Estimated Cost (M) | = | $26.3 | $10.9 | $14.9 | $15.3 | $13.2 | $14.9 | $15.3 | $16.9 | $16.5 | $14.5 | $15.5 | $16.3 | $17.0 | $15.0 | $20.5 | $14.5 | $14.7 | $19.5 | $47.5 | $15.2 | $16.2 | $15.5 | $17.4 | $17.0 | $25.0 |
| | Rank | | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 2 |

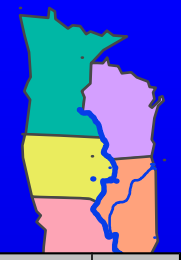
## Summary

**Variable: Number of high ranks from above**

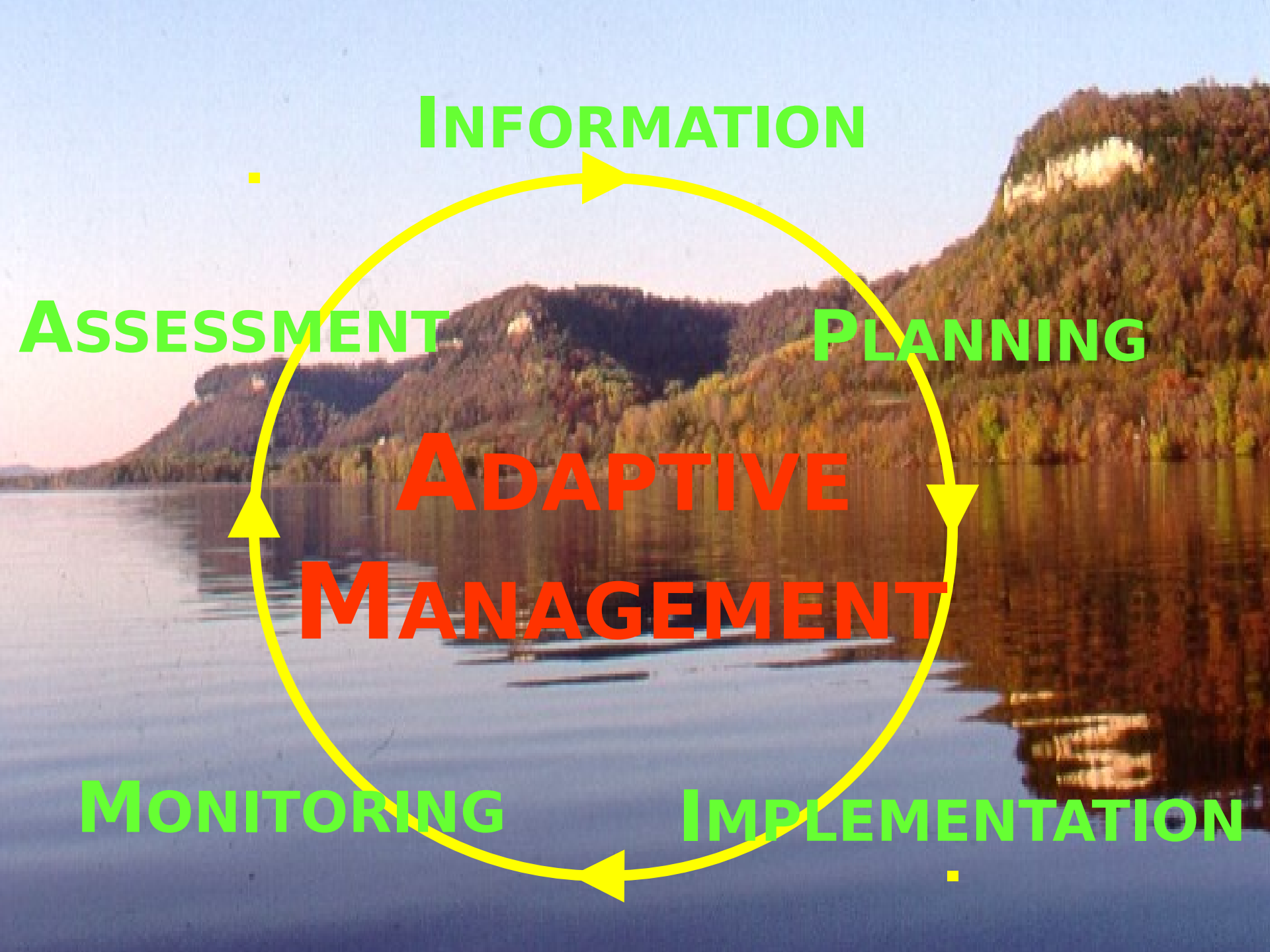
| | Locks and Dams: | 1 | 2 | 3 | 4 | 5 | 5a | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 24 | 25 | 26 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| High | = 2.5 to 3.0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Medium | = 2.0 to 2.49 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Low | = <2.0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Rank Score | | 2.2 | 2.3 | 3.0 | 2.5 | 2.2 | 2.3 | 2.5 | 2.8 | 2.7 | 2.8 | 2.8 | 2.3 | 2.8 | 2.7 | 1.8 | 2.3 | 2.2 | 2.7 | 2.0 | 2.3 | 2.3 | 2.7 | 2.5 | 2.2 | 2.3 |

= Priority sites for fish passage improvements

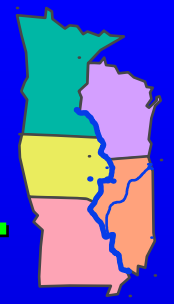
# ENVIRONMENTAL BENEFITS & QUALITY



| Alt. | Acres of Influence | Cost Eff. (Acres of Influence/Cost) | WLM | FP | Relation to Existing Condition | Study Measures | UMRCC Obj. | Eco. Diversity | Rank |
|---|---|---|---|---|---|---|---|---|---|
| **A** | 0 | $0 | - | - | Lose | 0% | 0/9 | Low | **5** |
| **B** | 119,000 | $13,000 | High | - | Maintain | 43% | 6/9 | Low | **4** |
| **C** | 223,700 | $12,000 | High | - | Restore | 56% | 7/9 | Moderate | **3** |
| **D** | 388,300 | $11,000 | High | High | Restore | 70% | 8/9 | High | **1** |
| **E** | 604,100 | $10,400 | Mod | Mod | Restore | 83% | 8/9 | High | **2** |


Information
Planning
Implementation
Monitoring
Assessment
Adaptive
Management

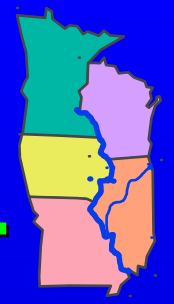
# Ecosystem Restoration Tentative Recommendation



**Approve Conceptual Framework of Alternative D $ 5.3 Billion 50-yr Plan**

- **Authorize Initial 15 Year Increment**
  - ✓ **Best return on investment**
  - ✓ **Best gains in diversity**
  - ✓ **Additional knowledge required to guide future investments**
- **Additional Implementation Strategies Included in Draft Report**
- **Programmatic and project specific authority**

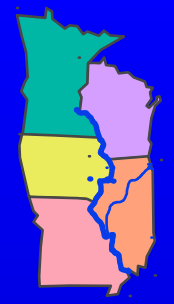
# Ecosystem Restoration Tentative Recommendation



**Approve Conceptual Framework of Alternative D* $ 5.3 Billion 50-yr Plan**

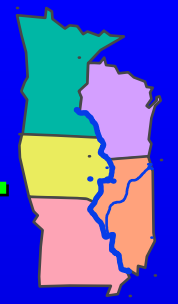
- **Report back to committee after 15 Yrs**
  - ✓ **Assessment of program**
  - ✓ **Recommendations for modifications**
  - ✓ **Potential further authorization**
- **Cost sharing option C(Under Review)**
  - ✓ **100% Federal on project lands, NWR, & other specific lands**

# Lessons Learned



- Dealing with uncertainty
  - Scenarios
  - Risk
- Virtual Teaming
- Collaboration
  - Stakeholders
  - Federal Principals Task Force
- Vertical Teaming

# Schedule



- Alternative Formulation Briefing 24 Feb
- Draft Feasibility Report (NRC) 30 Apr
- 90 day Public Review(Public Meeting) May-Jul
- Final Feasibility Report w/EIS(NRC) Sep 04
- Chiefs Report Nov04